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UNITED STATES DEPARTMENT OF AGRICULTURE  
BUREAU OF PLANT INDUSTRY  
OFFICE OF COTTON, TRUCK, AND FORAGE CROP DISEASE INVESTIGATIONS  
WASHINGTON, D. C.

WASHINGTON ASPARAGUS:  
INFORMATION AND SUGGESTIONS FOR GROWERS  
OF NEW PEDIGREED RUST-RESISTANT  
STRAINS



# WASHINGTON ASPARAGUS: INFORMATION AND SUGGESTIONS FOR GROWERS OF NEW PEDIGREED RUST-RESISTANT STRAINS.

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The Bureau of Plant Industry in cooperation with the Massachusetts Agricultural Experiment Station and other cooperators throughout the country has during the last 13 years developed high-yielding pedigreed strains of asparagus especially suitable for culture in regions where asparagus rust has caused serious damage. These new rust-resistant strains are now well disseminated among interested growers and seedsmen, some of whom have available stocks of the new strains for sale. This circular gives suggestions for the treatment and handling of the new strains, from various cultural and marketing standpoints, together with advice to seed growers and others who expect to continue developing these strains. For advice in regard to asparagus growing in general, see Farmers' Bulletin 829, entitled "Asparagus."

## HISTORY OF THE RESISTANT STRAINS.

Asparagus rust caused by a parasitic fungus (*Puccinia asparagi*), native to the Old World, was not found in America until 1896, when it was accidentally introduced in the vicinity of New York City. In 10 years it had spread to all the asparagus regions of the United States and caused serious losses everywhere. Sulphur-dust sprays were found effective in California, but in the East little help was obtained from spraying. It was gradually learned that certain new strains which had developed in Europe under rust conditions survived the rust attacks better than our old strains, which had lost any immunity they might once have possessed. In 1906 the Massachusetts Asparagus Growers' Association secured the cooperation of the Bureau of Plant Industry and the Massachusetts Agricultural Experiment Station in a breeding project to produce a strain better suited for growing in the badly infested regions of their State.

Varieties from all over the world were collected at Concord, Mass., and subjected to rust-epidemic conditions. Not one plant was found to be completely immune to rust. However, selections were made in 1908 from the most resistant ones and pedigreed seed produced in 1909. The lots of seedlings grown in 1910 showed one male, A7-83, from a lot of New American of unknown origin, to be a

wonderful plant in transmitting vigor and rust resistance to the progeny. A female plant, B32-39, from Reading Giant, procured from Sutton & Sons, Reading, England, when crossed with this male gave the best progeny lot of all the hundreds of combinations. From this pair came our first-named strain, *Martha Washington*.

The male plant, *Washington*, and the female plant, *Martha*, with other female plants, have since been removed to the Arlington Experimental Farm, near Washington, D. C., the crowns being separated into several divisions and planted in an isolated bed for breeding purposes. Several new female plants have been added from time to time as they have shown their value as producers of good seedlings. Notable among these is a giant female taken as a seedling from a bed of *Reading Giant* grown by Mr. C. W. Prescott at Concord, Mass., in 1910. This plant has been named *Mary*, and in combination with the male plant, *Washington*, gives our newest named strain, *Mary Washington*.

Thousands of lots of pedigreed seedlings have been grown during the years of our testing work, and the parent plants gradually weeded out for primary breeding work until four female plants represent the primary group of seed producers grown in the isolated field with the *Washington* male. The seed from these plants is used in starting new fields of pedigreed plants, which after rigid selection are used to produce commercial seed stocks for distribution. Net profit under rust-epidemic conditions has been the ultimate factor in deciding the value of any strain or progeny. Careful scientific studies of factors governing growth and inheritance have had much to do with the success of the work.

*Asparagus* is one of the oldest food plants of the world, and exists to-day in a form scarcely changed from the wild state. Because *asparagus* is dioecious and thus requires two parents for seed production, little advance has been made in producing improved strains. At present we know of no systematic breeding work under pedigree records except that discussed here, and its more recent cooperative developments.

#### DESCRIPTIVE NOTES ON PEDIGREED STRAINS.

Seed and yearling roots have been sent out for several years to experimenters under different names or numbers. The recent and more important lots have gone out under combinations of names and numbers that indicate the relation of the seed to the named parents, *Washington*, *Martha*, and *Mary*, or of the still unnamed females, as R2-22, R4-101, etc. The following descriptive notes will give growers a general idea of the different strains and pedigrees.

“*Martha Washington*.”—The first-generation offspring of B32-39, *Martha*, pollinated by A7-83, *Washington*, the most highly rust-resistant strain of *asparagus* yet

found. Shoots usually dark green with a heavy purple tinge, with a tight, pointed bud, and not branching out until well beyond the market height, with a clean, straight growth, and of the finest market type. This strain is rather late, and seems to avoid the late frosts of spring, which often result disastrously for growers of the early varieties. Martha Washington seeds are smaller than the average, and the seedlings are apt to be behind other strains in size until late in the first season, but this small size is overcome in later years, and its yield is second only to Mary Washington, and perhaps to one or two of the newer unnamed strains.

*"Mary Washington."*—The first-generation offspring of A5-11, Mary, pollinated with A7-83, Washington. This progeny lot has the largest seed and the largest seedlings of any combination yet tested. This size holds as the plants mature, so that anyone can pick out rows of this strain in our test fields without difficulty. The shoots are very large on the average, with a tendency to be oval in cross section; scarcely less high in color than Martha Washington, very early and prolific. The high-branching habit of this strain makes it possible to cut unbranched shoots with good tight buds as much as 2 feet long. The branches of the mature shoots after they grow up are much less spreading than those of ordinary asparagus. While not as rust resistant as Martha Washington, this strain suffers no appreciable loss under severe rust conditions.

*"Washington Stock."*—Seed and crowns sent out under this name have come from plants in some pedigreed test fields where the progeny of numerous select females crossed with Washington have been planted. Usually a large percentage of these come from Martha Washington plants, which are used as checks in our tests. The name "Washington Asparagus" is applied to seed from selected second-generation plants where Washington is the sire or grandsire of all the plants in the field used for seed purposes.

*"Martha Washington Stock."*—This is seed from first-generation plants of Martha Washington in pure stand. This name should be kept distinct from Martha Washington, which is applied only to the immediate offspring of the two named parents in our breeding plat at Arlington Experimental Farm. The designation "Mary Washington Stock" is similarly applied to the seed from first-generation Mary Washington plants.

Pedigree numbers or combinations of unnamed females with Washington should be preserved by growers, as some of them will later be named and thus these records will be valuable. The lot numbers attached to seed packets put up by the United States Department of Agriculture refer to office data on cleaning, field records of harvesting, etc., in order to check up any possible errors.

#### CULTURAL AND MARKETING SUGGESTIONS.

In addition to the advice given in Farmers' Bulletin 829, certain suggestions are added here that will help in keeping up the quality of the new strains and to insure conditions suitable for the production of the best market asparagus possible.

*Sowing seed.*—Seed should be sown early in spring in the regions in which we have experimented. It takes so long to come up that weeds are very likely to get a start ahead of it. For this reason a clean seed bed is needed. Quack-grass or other plants with rhizomes should be absent, as their removal is likely to destroy the young asparagus seedlings. A small percentage of spinach or radish seed

might be added to mark the row for cultivation before the asparagus seedlings show. In most regions it is safe to plan on five or six plants to the foot. Closer planting is apt to produce a tangled mass of roots hard to separate. In our work we either drop seed by hand or, when in quantity, sow with a Columbia hand planter, which spaces each seed. If two or more seeds fall together, they are sure to make a tangle, and thinning is not recommended. The seed bed should be quite uniform to produce the best results in grading the roots after digging. Cultivation between the rows with hand cultivators or scuffle hoes is best when, as in the North, the rows are too close for horse cultivation. Weeds in the row should be removed by hand. The use of tools in the row should be avoided at all times. When the plants get up high enough a little dirt can be thrown up to the row to hold the shoots erect. At the end of the season allow the tops to die down and make a cover for holding snow in winter. In the North it is highly advisable that a layer of coarse hay or straw similar to that applied to strawberries be put on after the ground has frozen; otherwise many of the roots will winterkill.

*Digging roots.*—When planted in 18-inch rows 1-year-old crowns can be thrown out of the ground with a good 2-horse plow. Before plowing out the first row a furrow should be run about a foot away from the row to aid in freeing the roots. In loose sandy soil, which is best suited for seedling production, a 6-tined short-handled manure fork is used in completing the work begun by the plow. The sand must be shaken out well and the roots thrown into windrows. It is most important that the plowing out be done before growth starts; otherwise much of the stored food of the roots will be crowded out into the young shoots, which are always broken off. It is a good idea to let the roots dry out more or less in the spring sun before storing them preliminary to planting, which often is not done for a month or more after digging. If dried down properly, the roots can be left in a cool storage place and kept away from soil moisture by dry trash or straw. Where available, a board floor or dry concrete platform is satisfactory. The best storage temperature is about 40° F., but if the roots are not moist they will stand a higher temperature for a long time without serious loss.

In digging seedlings great pains should be taken to preserve unbroken and unbruised all the storage roots leading away from the crown, as these contain food supplies needed for the new growth. This is important in getting the new bed off with as little check as possible. The practice of trimming down these roots to a uniform length of 6 or 8 inches can not be too strongly condemned.

As far as our experience goes, 1-year-old roots do better than 2-year-old roots of the same stock. The large 1-year-old roots selected from any seedling field are best, in that they produce

a higher percentage of giant asparagus much sooner than the small roots from the same field. Our plantings, even of pedigreed stock, are now made from less than 1 out of 10 roots as they run in the field. Not more than half of the roots in the field should be saved for planting, all the small or broken roots being buried in the compost heap.

After sorting over the roots, the ones to be planted or sold should be counted out and tied in bundles of 50 or 100. The best bundles are made by alternating the layers of roots so that half the crowns are at each end. In this way the buds are protected by the overlapping roots. In shipping roots we have found it best to wrap the bundles in two thicknesses of heavy paper, one of which is oiled. The ends of the package are left open until the shipment is ready to go; then the bundles are packed closely in bags or barrels properly labeled and by preference sent by express or parcel post. Last year bundles came through in good condition after being more than a month on the road. Where more than one kind of roots are kept near together it is necessary that the lots be carefully labeled, to avoid mistakes. When the bundles are being wrapped, each one should be marked with the lot number or name to prevent mixing.

#### PLANTING.

It has been found by experience that it is not advisable to plant a permanent bed on ground occupied by seedlings the year before. Likewise, for best results seedlings should not be followed by another seedling bed.

#### BREEDING WORK BY GROWERS.

The pedigreed stock now being distributed to growers is intended to form a basic stock for further breeding work. While the Bureau of Plant Industry will continue to distribute the new strains, private enterprise must be expected to furnish the general trade with its main supply of seed and roots. The following general suggestions will aid cooperators in establishing methods of handling their seed fields.

#### TYPE OF PLANTS TO SELECT.

The ideal shoot should be of fairly large diameter, say about 1 inch; straight and not seriously flattened; of clean growth, with scales fitting closely in a tight bud and not too large or widely projecting on the lower stem. The bud should be pointed and should not open so that the lateral buds show much until the shoot is 8 or more inches out of the ground. The ideal shoot should be cylindrical, or nearly so, without a strong taper as it gets above the soil. Many types have an undesirable bulge just below ground that is bad from the viewpoint of the consumer, as this is all waste. The color should be dark green, with a heavy overcast of rich purple; reddish or splotched overcoloring is to be avoided.

## SELECTING SEED PLANTS.

The new pedigreed strains to be available for seed production must not be planted in fields near inferior varieties. This is most important. As any field, no matter how carefully selected the roots therein may be, will have off-type and poor plants, breeders will find it to their advantage in growing good seed to go through the field at the beginning of blooming time and grub out the poor male plants which by means of their pollen will transmit poor quality to the seed of good females.

## HARVESTING SEED.

Plants with uniformly large, tall stalks whose branches do not start close to the ground should be selected. Low branching is almost a sure sign that the shoots will have poor open buds, a most undesirable quality in green asparagus. Seed harvest should not begin until the berries are red and soft; more or less shriveling of the seed takes place if harvested before this stage is reached. The plants where possible should be left until their season is well over and they have begun to lose their leaves. Then they can be cut and piled on a canvas or on a tight floor and the berries removed by beating or stripping by hand. The collected berries and trash can be placed in burlap bags and well tramped or pounded to break the berry coats and release the seed. This mass can then be floated in water in a barrel or tub, and well stirred to allow the seed to settle. If water is allowed to run into this mass through a hose, the stems and berry skins and pulp will wash out and can be removed from the top. Continued washing and stirring will leave a well-cleaned seed mass, which can be spread out on a sloping platform on bagging to dry. When thoroughly dried the seed can be cleaned of the remaining trash and hulls by ordinary seed-cleaning machinery. Although asparagus seed will germinate well for several years, the best results follow the planting of seed of the previous season.

## SUGGESTIONS FOR SELLING SELECT SEED AND ROOTS OF WASHINGTON ASPARAGUS.

The grower who expects to sell seed or roots of the new strains must remember that constant care is necessary to keep up a high standard. High prices are only justified by high quality, constant selection, and personal attention to details. The added care and cost naturally add a greater money value to the new stock far above that of inferior strains, seed of which often sells for 25 cents a pound. High-grade seed of standard varieties commonly sells for as much as \$5 a pound. The grower's increased net profit from pedigreed stock justifies him in paying even higher prices. Any advertising matter should be honestly worded and exaggerated statements avoided if the grower's confidence is to be secured.

## **MARKETING WASHINGTON ASPARAGUS.**

To get the best returns from fields of the new strains, they should be marketed as Washington asparagus. The bunches and packages should have neat labels with the variety and grower's names. The grading should be carefully standardized and persistently maintained. A permanent reputation for high quality and honest grade pays in net profit. The consumer's demands as to quality, size, and freshness should be met, and he should be made to feel that the new strains are developed to best suit his needs. Other strains should not be mixed in with Washington asparagus and sold as the new stock; neither should the grower lose the advantage to be gained by selling the new kinds separately under their variety names.

## DISTRIBUTION OF THE NEW STRAINS.

The Bureau of Plant Industry will not make general distributions of seed or roots of these new strains. The stock sent into any region will be turned over to one or two growers who have facilities for growing it away from inferior strains and using it to supply others in their region. The names of firms and individual growers who may have stock of the new strains can be obtained from the Bureau of Plant Industry.

J. B. NORTON.

Approved:

Wm. A. TAYLOR,

*Chief of Bureau.*

FEBRUARY 3, 1919.

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